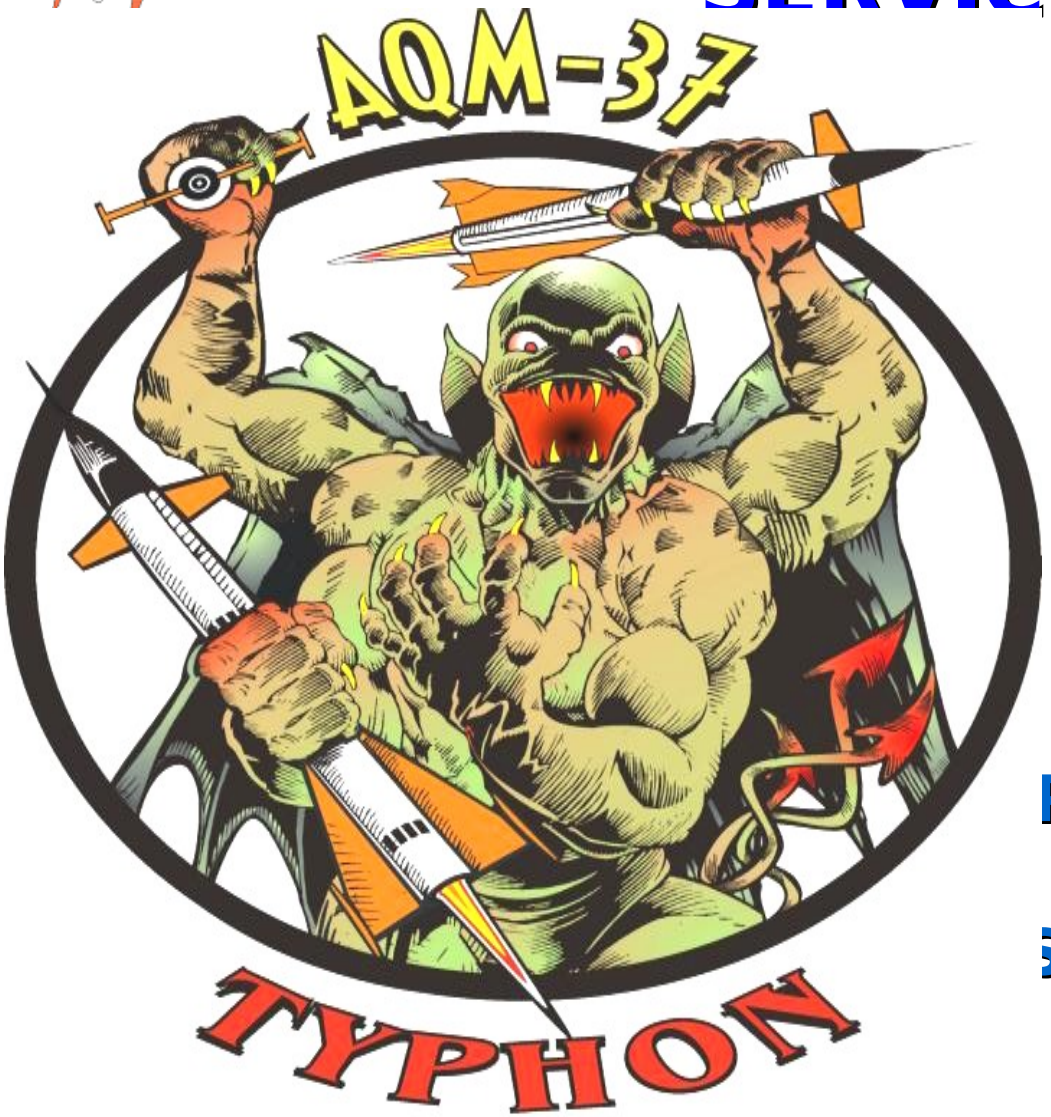
Joint US/UK AQM-37 SUPERSONIC TARGET SERVICES



Presented by:

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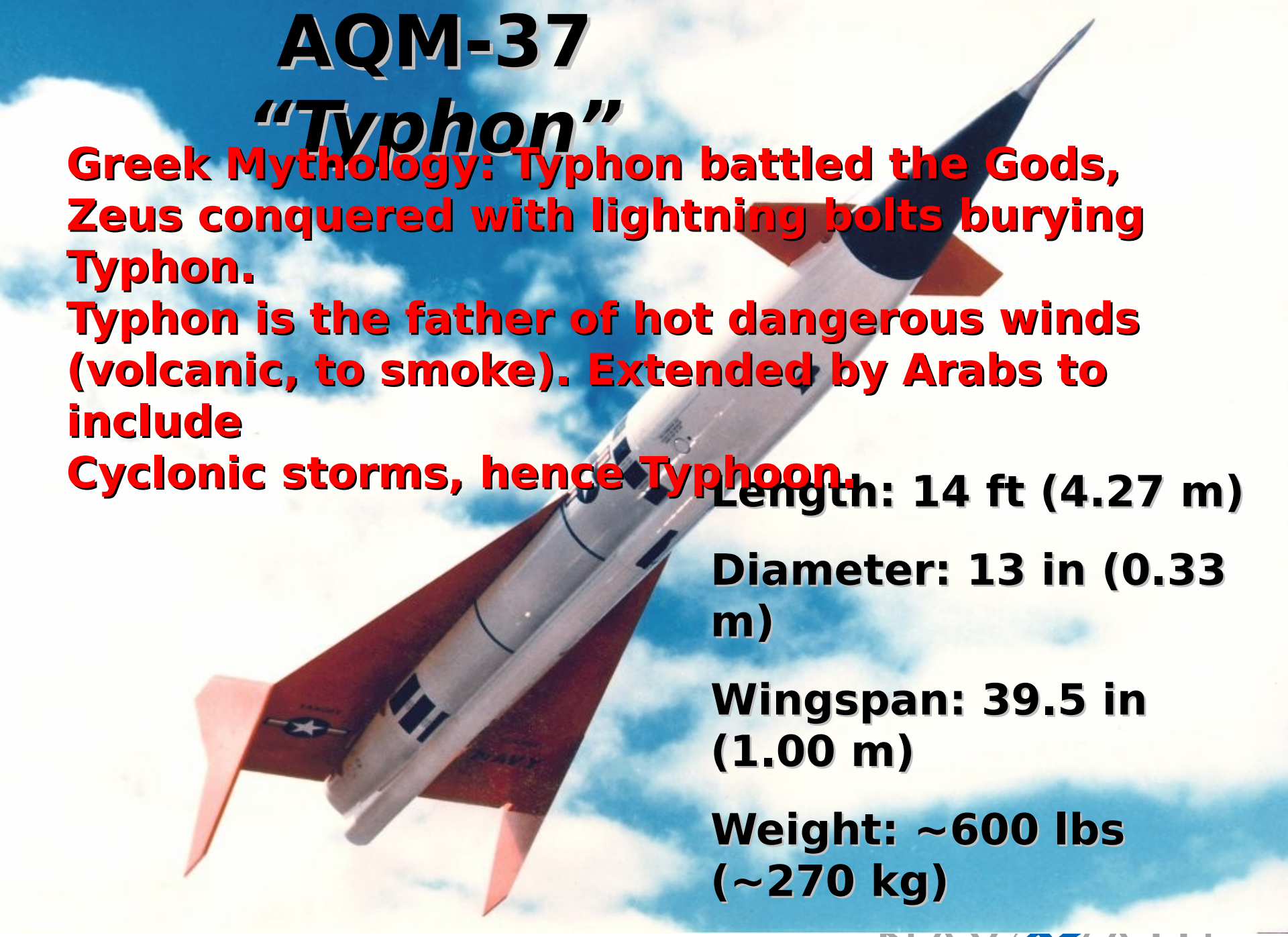
AQM-37 "Typhon"



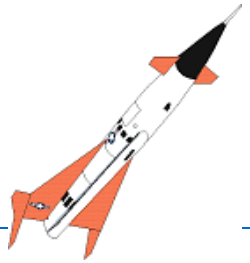
Greek Mythology: Typhon battled the Gods, Zeus conquered with lightning bolts burying Typhon.
Typhon is the father of hot dangerous winds (volcanic, to smoke). Extended by Arabs to include
Cyclonic storms, hence Typhoon.

Length: 14 ft (4.27 m)

Diameter: 13 in (0.33 m)

Wingspan: 39.5 in (1.00 m)

Weight: ~600 lbs (~270 kg)



Outline

- **US/UK Supersonic Target Case. Provide target services under FMS or private party agreements**
- **Target Capabilities - General Description**
  - **Air to Air**
- **Target Requirements to Deploy**
- **Additional Mission Capabilities**
  - **Air to Surface**
  - **TBM**

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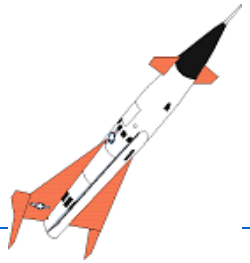

Who we are

- **We are the U.S. Navy's AQM-37 Supersonic Target Integrated Product Team.**
- **We provide U.S. Navy, Tri-Service and FMS supersonic HIGH ALTITUDE Target Services.**
- **We provide "turn-key" services, everything needed for a customer mission. We arrange the launch aircraft for the mission, payloads,….**

AQM-37 target, relative size

Joint US/UK AQM-37 SUPERSONIC TARGET SERVICES

- **Who is the Joint Team?**
- **The United Kingdom Ministry of Defense has retained our target services through a FMS, Foreign Military Sales case to support testing of Eurofighter.**
  - **BAE aircraft team**
  - **QuintiQ Range team**
- **We, the U.S. Navy AQM-37 IPT, are sending a detachment to the Hebrides Test Range, Scotland, providing "turn-key" supersonic target presentations. Our team members:**
  - **AQM-37 Maintenance contractor WFI**
  - **Threat Sim IPT – provides Jammer payload**
  - **Launch aircraft – New Mexico Air National Guard F-16's**

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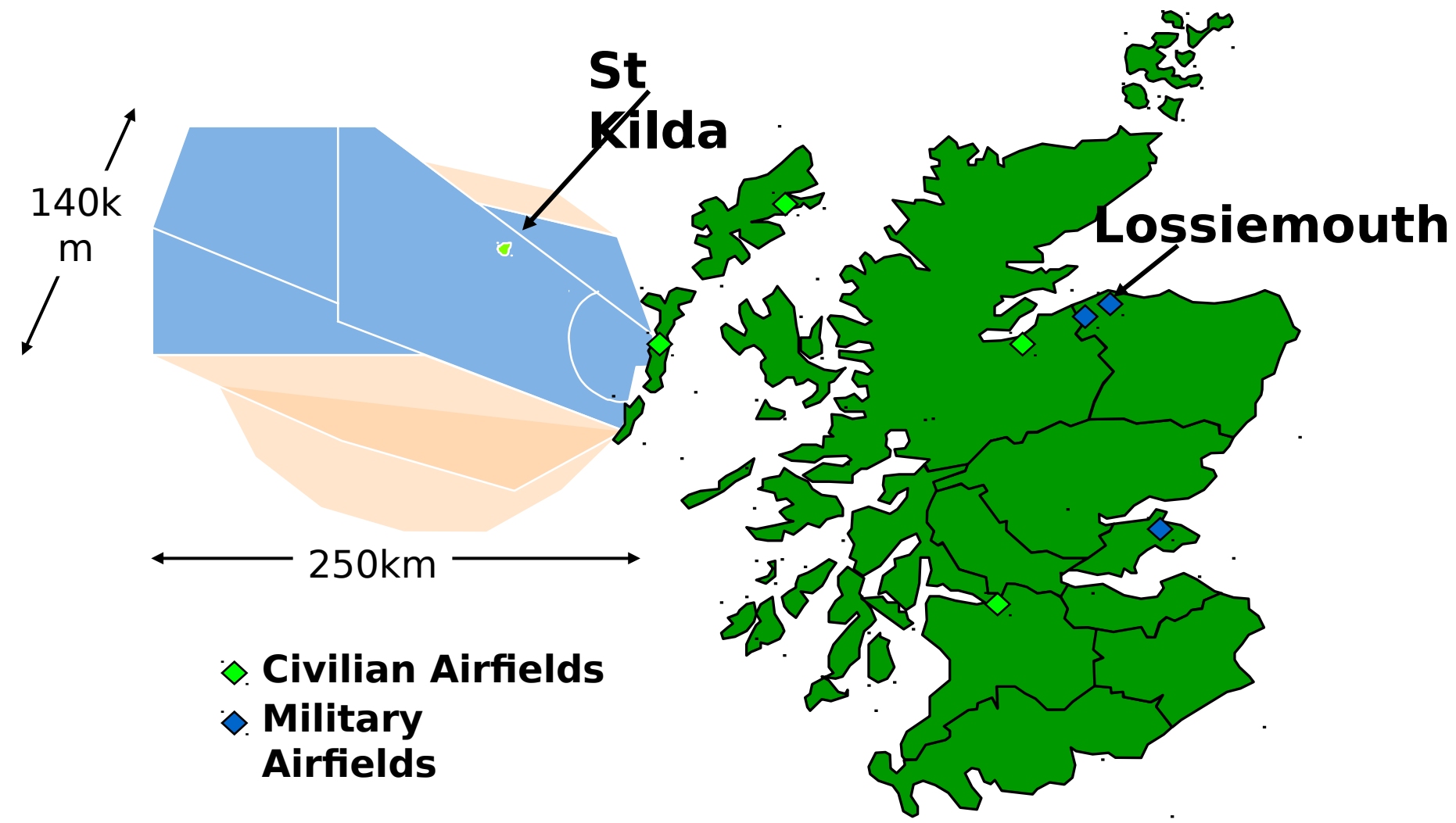
What: Eurofighter testing support

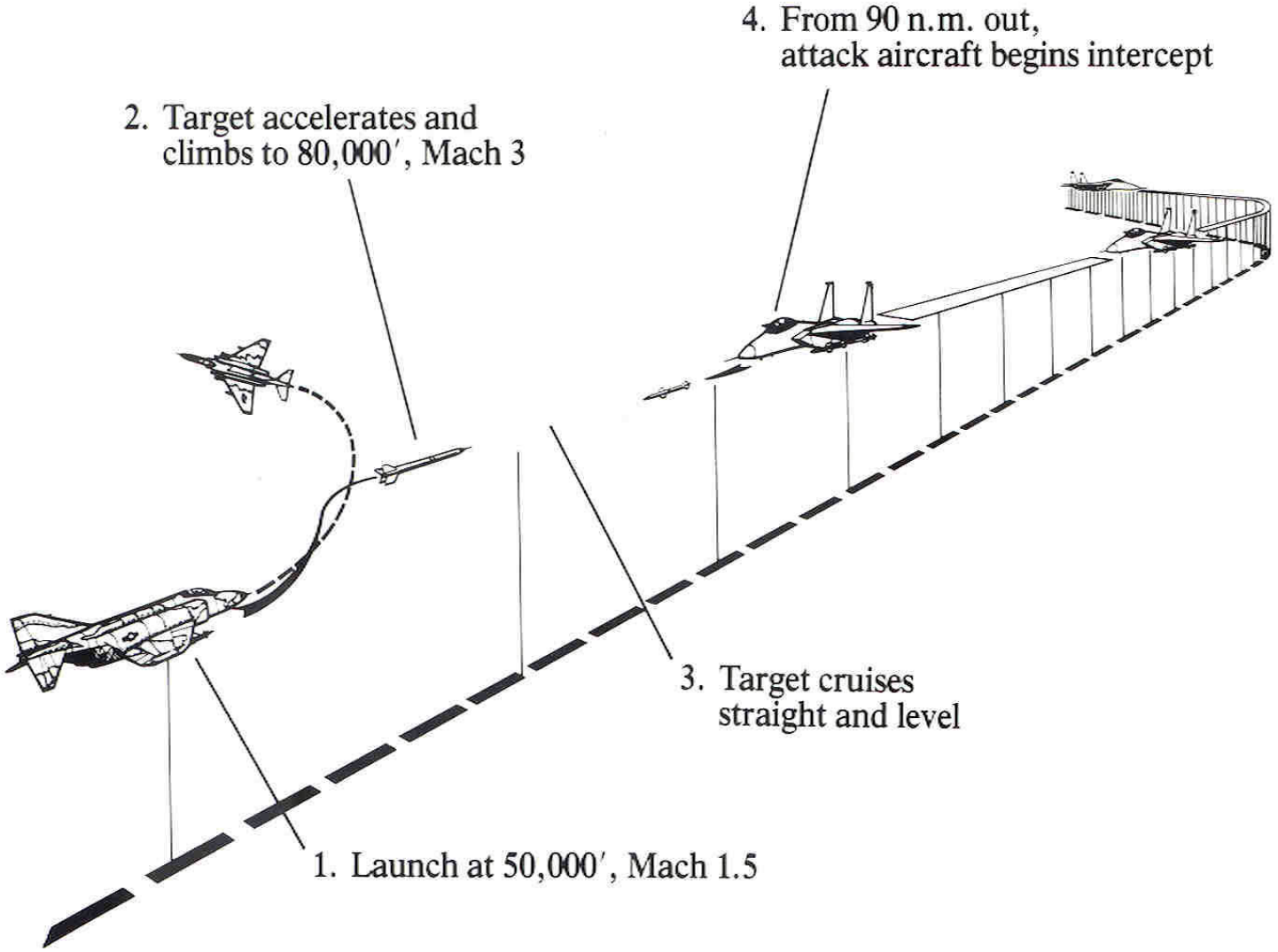
Support to two mission scenarios

photo from BAE web site

Where:
Hebrides Range, Scotland

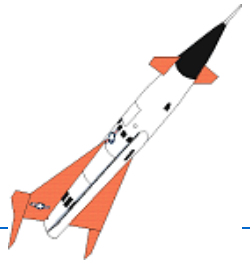


Typical Air-to-Air Mission


4. From 90 n.m. out, attack aircraft begins intercept
2. Target accelerates and climbs to 80,000′, Mach 3
3. Target cruises straight and level
1. Launch at 50,000′, Mach 1.5

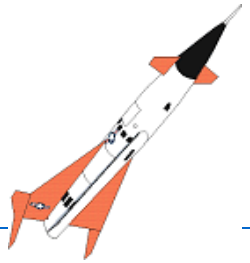
AQM-37

28V DC
120V AC
AQM-37C
STY00058
AQM-37C
STY00071
TARGET
0036
GMGY
120V AC



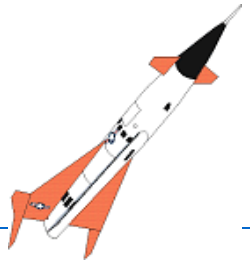
AQM-37 General Description

- **Delta Winged, Liquid Fueled Rocket**
  - **Dual Propellant (IRFNA/MAF4)**
- **Air Launched**
- **Flight Profiles Programmed Via Switch Settings**
  - **Cruise - 500 ft AGL (1.0 Mach) to 100 kft MSL (4.0 Mach)**
  - **ARM - 5 to 65 Degree Dive Angles, Includes Powered Dives**
  - **TBM - Apogees to 300KFt and a range of 165 miles with terminal velocities approaching Mach 5.0**
- **Ground Commands**
  - **Adjust Heading and Climb Angle As Required**
  - **Control Engine Ignition, Payloads, and FTS Terminate**
- **Range Compatible**
  - **Redundant FTS, Radar Tracking Beacon, Telemetry**
- **RF Signature - ~0.1-0.2 m² Unaugmented**



AQM-37 HISTORY

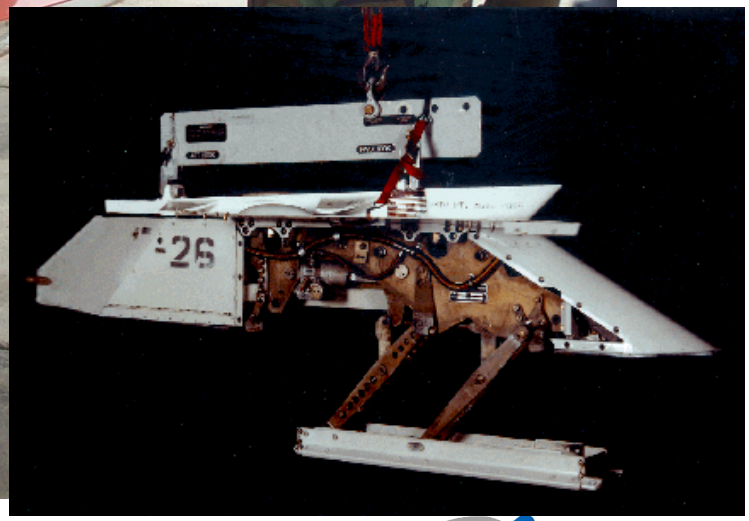
- 1962 AQM-37 prototype developed.
- 1982 AQM-37A's were developed into the AQM-37C target. First AQM-37C Flight Occurred In October Of 1982.
- First Flight Of The AQM-37C (EP) Occurred in 1984.
- 1245 AQM-37C Targets Have Been Manufactured By RAC.
- AQM-37D developed to replace obsolete parts.
  - 35 delivered. Final deliveries in Dec 2001.
  - The AQM-37 target has been in continuous service with the U.S. armed services since 1963.

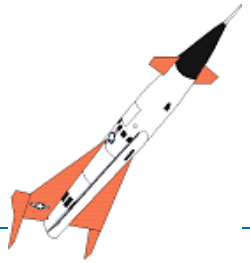


LAUNCH CAPABILITIES

- **Currently Qualified on F-16 aircraft**
- **Utilizes LAU-24B/A Launcher**
- **Activated by MK-9 Mod 0 Cartridge**
- **Launches can be made from Mach 0.6 at 1000 ft. to Mach 1.8 at 55,000 ft.**
- **Trapeze Ejection System Pushes Target Forward and Down**

Trapeze Launcher





FLIGHT CONTROL SYSTEM

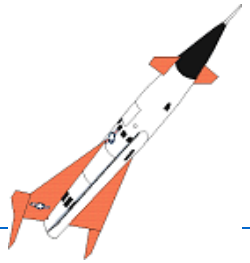
- **Digital Avionics Processor (DAP)**
- **Flight Control Panel**

  Standard
  - **Mach No. at Boost Cutoff**
  - **Cruise Altitude**
  - **Time to Dive**
  - **Dive Angle**
  - **End of Flight Timer**
- **Differential Pressure Transducer/Pitot Tube/Altitude Transducer**
- **Pitch and Roll Gyro/Yaw Gyro/Roll Rate Gyro**
- **Canard Actuator/Aileron Actuator**
- **Command Control**

  Standard
  - **Heading Changes**
  - **Payload On/Off Control (Prelaunch)**
  - **Destruct (Range Safety Controlled)**
  - **Dive Command**
  - **Pull Up Command**
  - **Ignition Delay Command**

FLIGHT TEST RELIABILITY

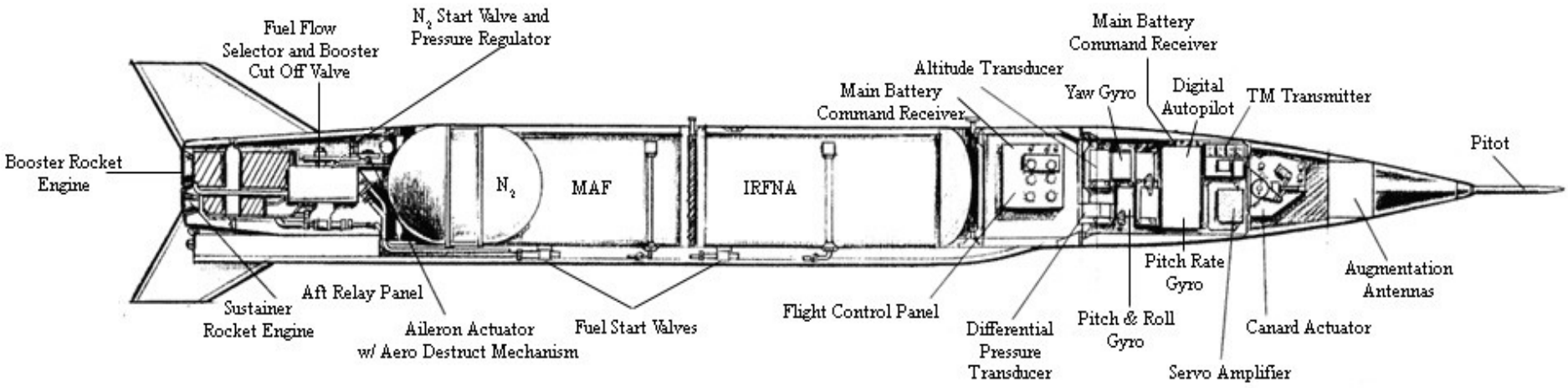
- **AQM-37C Flight Test Reliability is 95%**
  - **Based on over 1000 flights and counting**

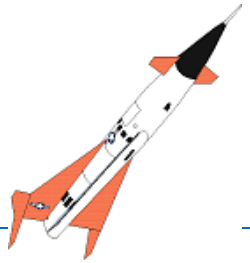


BUILT IN RANGE SAFETY FEATURES

- **Digital Avionics Processor Will Command Destruct Under Certain Conditions.**
  - **Loss Of Command Signal For More Than Five Seconds**
  - **Target Heading More Than Ten Degrees Off Course For More Than 30 Seconds**
  - **Target Battery Below 22 Volts For More Than Ten Seconds**
  - **End Of Flight Timer Times Out**
- **Redundant Destruct**
  - **Two Independent Flight Termination Receivers**
  - **Redundant Battery**
- **Destruct Consists Of A Ballistic Dive To Impact Produced By Rapid Roll Rate Due To Full Aileron Deflection.**

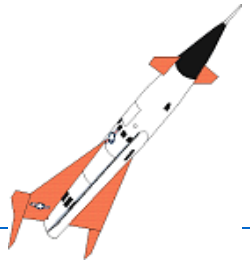
Detailed Cut Away View of the AQM-37 Target





Payloads

- **X-Band Noise Jammer in the AQM-37 Aerial Target.**
  - **Relocate several existing Target components on the payload shelf and Battery Door to fit the Jammer Components in the Target.**
  - **The LAU-24 Launcher wiring modification in order to meet the Jammer's electrical power requirements to power on during Captive Flight.**
  - **Augtenna – Passive RCS amplification**
- **Second Mission: Standard Active RCS kit amplifiers.**

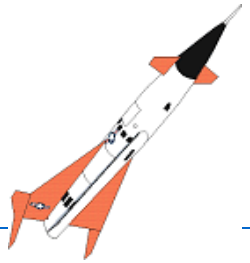


Deployment Critical Infrastructure

- **Bases/runways - F-16 > 8000 Ft**
- **Weapons/Targets storage magazines**
- **Target Build-up area**

- **Target Control ***
  - **Terminate and Control commands**
  - **Flight Displays**
    - **Telemetry**
    - **Radar Track**
  - **Comm net**

  - *** AQM-37 also has an Open Ocean Fire and Forget Capability**



- **Additional capabilities of AQM-37 Target**
  - **Air-to-Surface Mission Profiles**
  - **TBM (Tactical Ballistic Missile) Mission Profiles**

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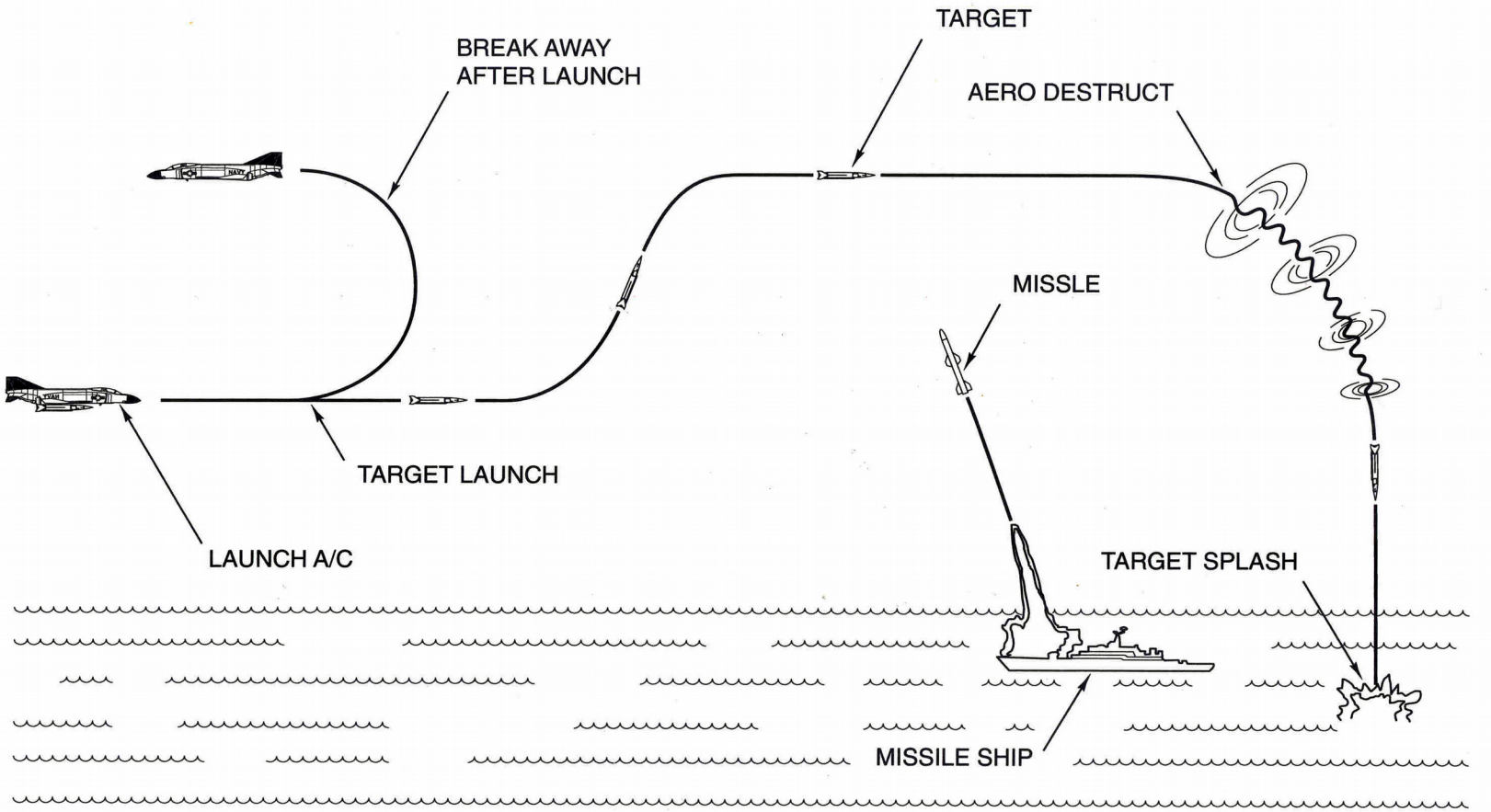
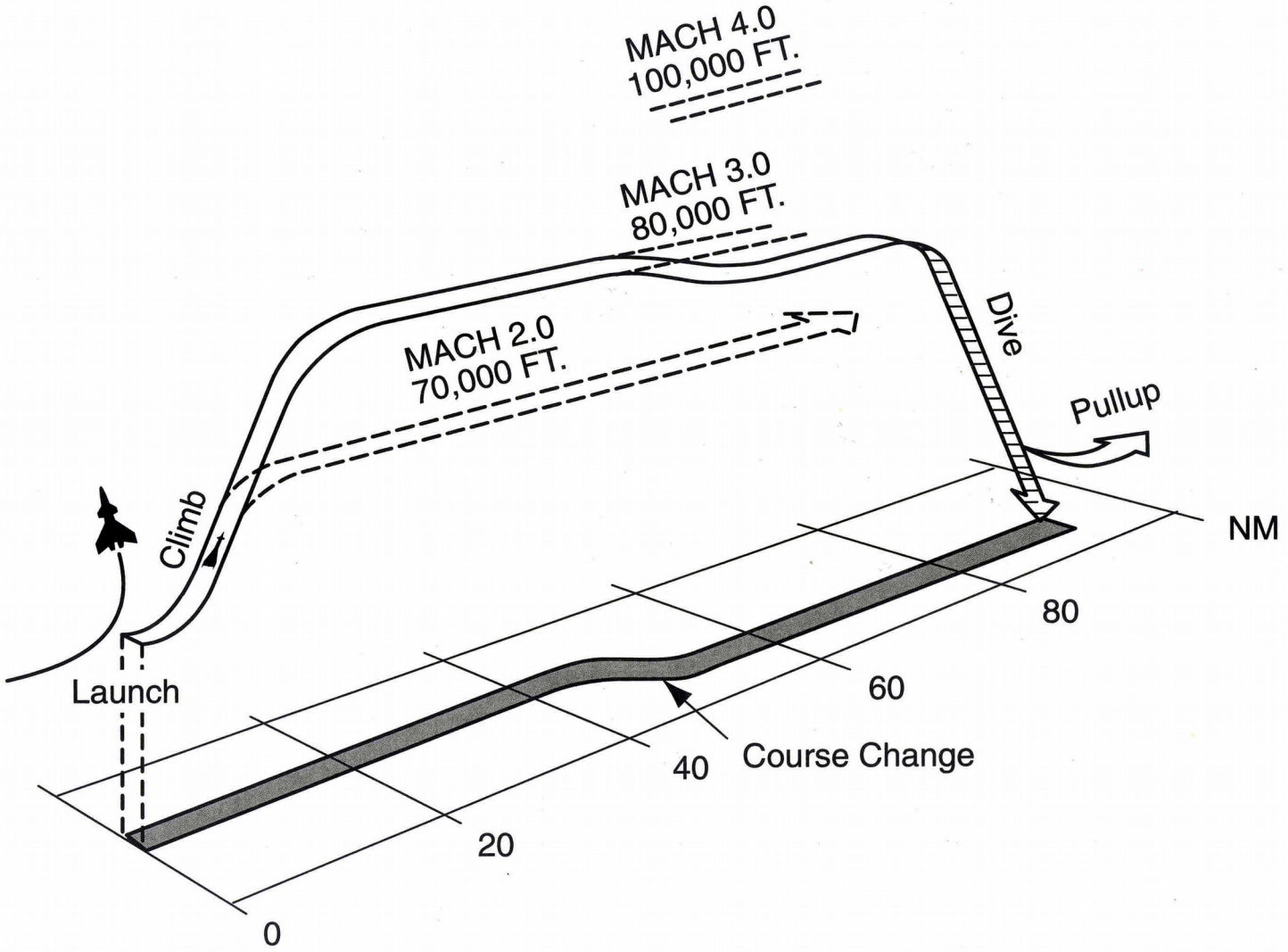
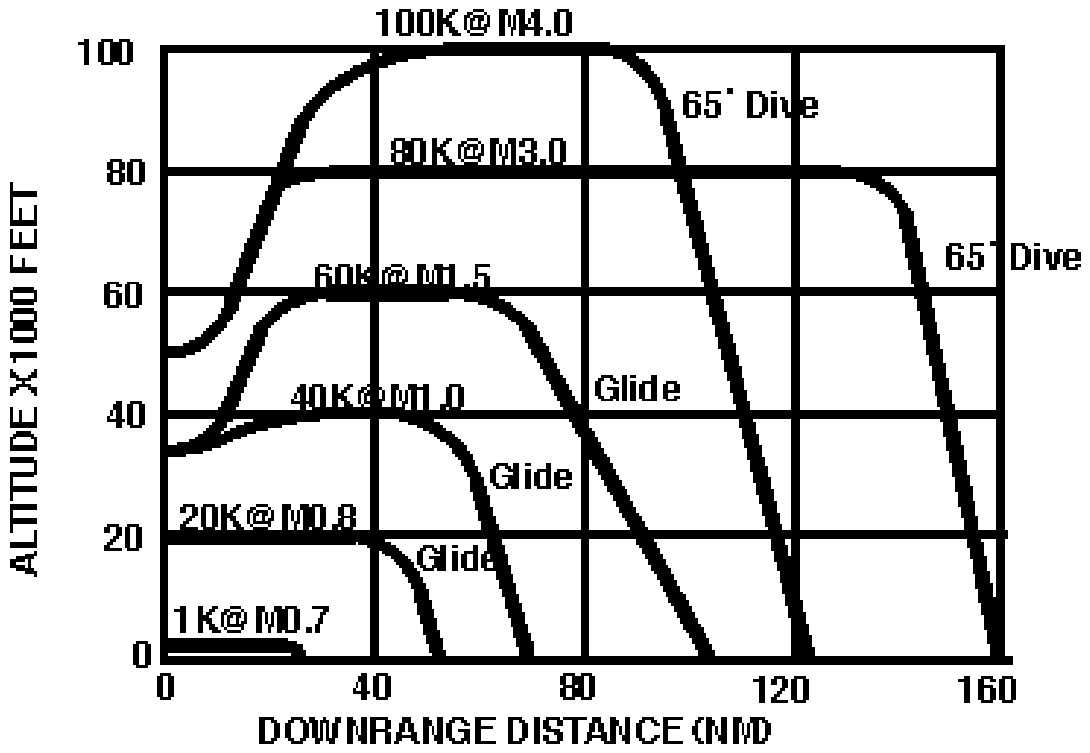
Typical air-to surface mission profile



Lateral maneuvers for course correction as well as dives and pull-ups to simulate missile threats.

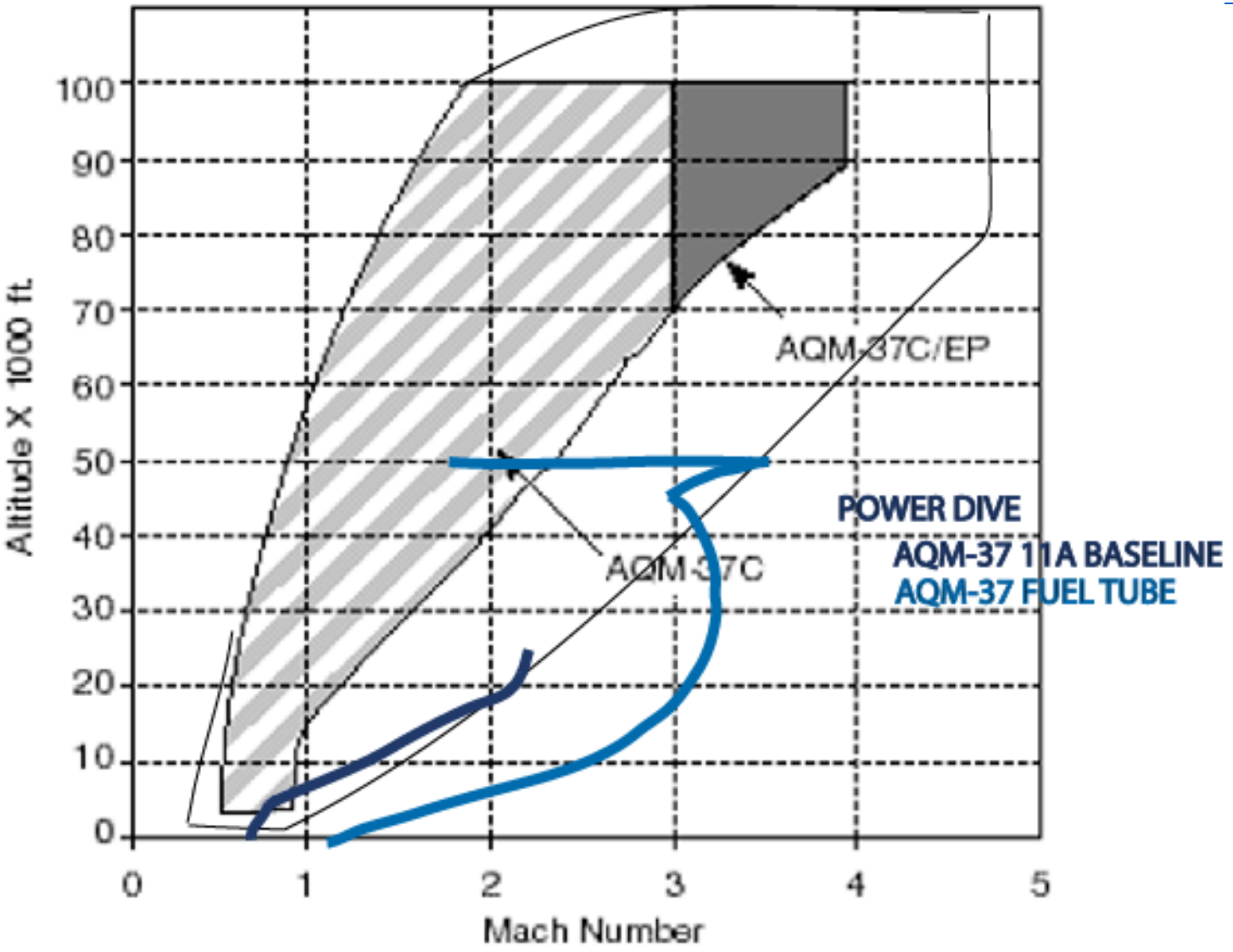


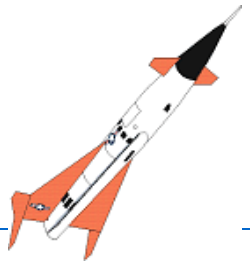
Typical Flight Profiles



Typical Flight Profiles

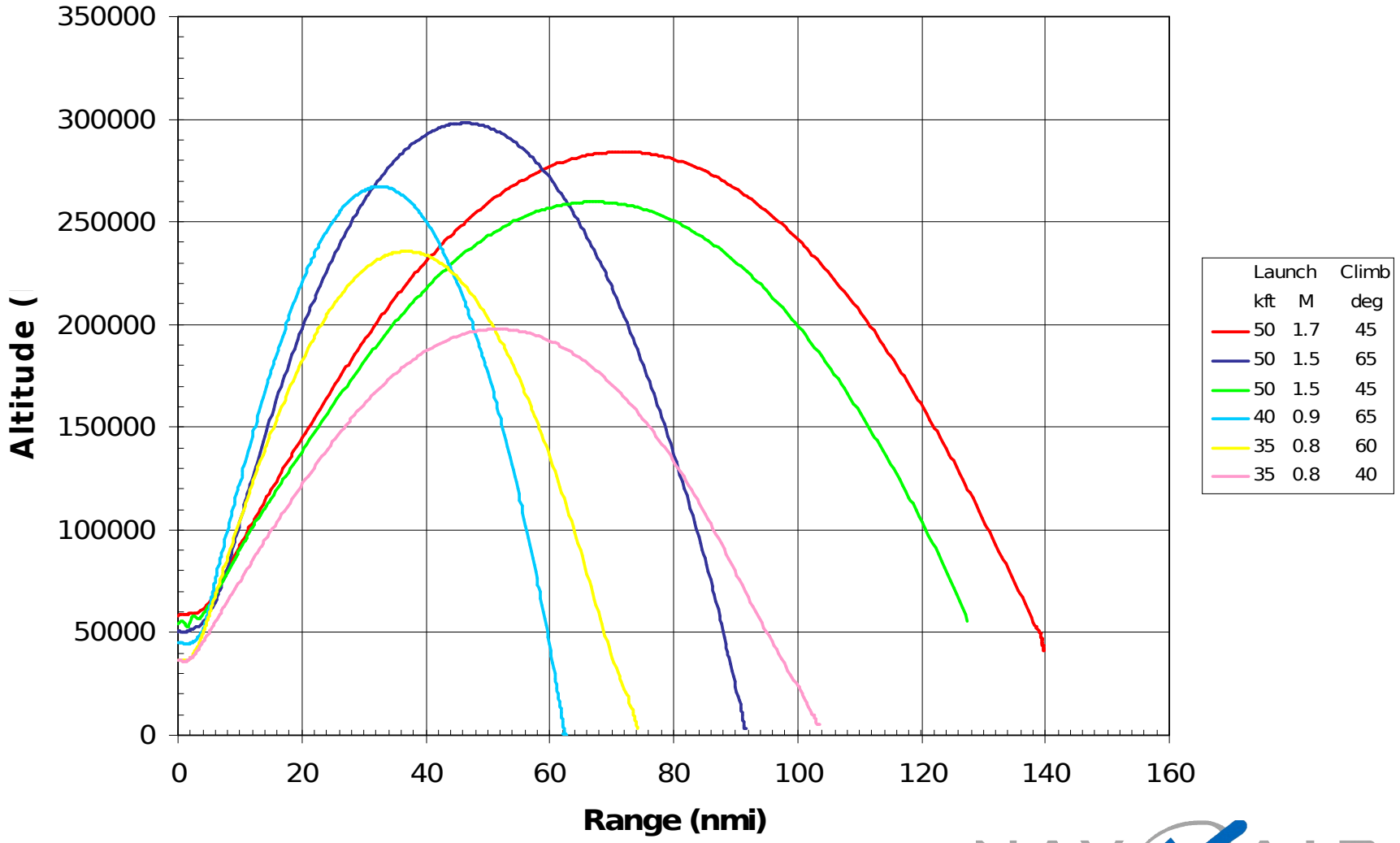
AQM-37 Spec and Expanded Demonstrated CRUISE Flt Envelope

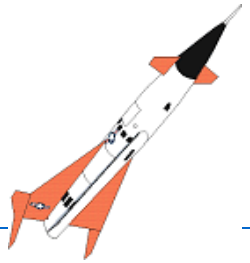




TBM Mission Profile, Flight History

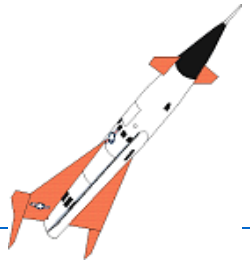
TRACK DATA OF SIX AQM-37 TBM FLIGHTS





Performance Capabilities
TBM Profiles

- **Apogee: to 100 km**
- **Range: to 275 km**
- **Climb Angle: 20-65 degrees**
- **Dive Angle: 20-70 degrees, or Ballistic**
  - **can be increased/decreased real-time to adjust impact point or shape trajectory**
- **Speed: to 1350 m/sec on Re-entry**
- **Flight History: 8 “TBM” Flights to Date**
  - **all successful**
  - **plus ~15 ARM-3 profiles (38 km apogee)**
- **AQM-37 is a VERY cost effective Target as compared to alternatives.**



- **Questions?**